

## CHILD-RESISTANT FLIP-TOP CLOSURE

### BACKGROUND OF THE INVENTION

#### 1. Field of the Invention

This application relates to dispensing closures, and particularly to child resistant dispensing closures for dispensing materials, such as liquid detergents, that are unsuitable for human consumption.

#### 2. Description of the Related Technology

Dispensing closures are in wide use for dispensing materials, particularly liquids, throughout the world. A dispensing closure is simply an article that is mountable onto a container that is designed to permit closure of an orifice of the container and, when the closure is opened, to permit material to be dispensed from the container through the orifice and the dispensing closure. Dispensing closures are quite common in the packaging of certain beverages, such as sports drinks, but are also used to dispense materials, such as oils and liquid detergents, that are unsuitable for human consumption.

One type of dispensing closure that is increasingly popular is the flip-top variety, which is characterized by a main body portion that is securable to a container and a lid portion that is hingedly mounted to the main body portion. The main body portion typically includes a dispensing orifice that is sealed by closure of the lid and uncovered when the lid is opened. When a consumer desires to dispense liquid from this type of dispensing closure, he or she will flip the lid open and squeeze or invert the container.

Of course, it is desirable that any closure that is used for dispensing material that is unsuitable for human consumption be configured so that it is as resistant to opening by infants and young children as possible. The packaging industry today has been unable to provide a child resistant flip-top type closure. A need exists, however, for an effective flip-top type dispensing

closure that is effective in preventing opening by infants and small children, but that presents little difficulty to an adult.

### **SUMMARY OF THE INVENTION**

5           Accordingly, it is an object of the invention to provide an effective flip-top type dispensing closure that is effective in preventing opening by infants and small children, but that presents little difficulty to an adult.

          In order to achieve the above and other objects of the invention, a child resistant, flip-top plastic closure for a container according to a first aspect of the invention includes a closure main  
10   body that is adapted to be secured to a container, the closure main body having an orifice defined therein for dispensing a substance from the container; a lid member that is hingedly mounted to the closure main body for movement between a first closed position wherein the lid member covers the orifice and an open position wherein the orifice is uncovered by the lid member; and child safety interlock structure for securing the lid member in the first, closed  
15   position relative to the closure main body until an unlocking action other than lifting the lid member is performed by a consumer.

          According to a second aspect of the invention, a child resistant container assembly includes a container having at least one sidewall that defines an interior space, the container comprising a neck portion with external threading provided thereon; a closure main body having  
20   internal threading that is interengaged with the external threading of the container neck portion, the closure main body having an orifice defined therein for dispensing a substance from the container; retention structure for deterring removal of the closure main body from the container after the closure main body has been screwed onto the container; a lid member that is hingedly mounted to the closure main body for movement between a first closed position wherein the lid  
25   member covers the orifice and an open position wherein the orifice is uncovered by the lid member; and child safety interlock structure for securing the lid member in the first, closed position relative to the closure main body until an unlocking action other than lifting the lid member is performed by a consumer.

These and various other advantages and features of novelty that characterize the invention are pointed out with particularity in the claims annexed hereto and forming a part hereof. However, for a better understanding of the invention, its advantages, and the objects obtained by its use, reference should be made to the drawings which form a further part hereof, and to the  
5 accompanying descriptive matter, in which there is illustrated and described a preferred embodiment of the invention.

### **BRIEF DESCRIPTION OF THE DRAWINGS**

10 FIGURE 1 is an isometric view of a child resistant flip-top closure constructed according to the preferred embodiment of the invention, shown in a closed position;

FIGURE 2 is an isometric view of the closure shown in FIGURE 1, depicted in an open position;

FIGURE 3 is a cross-sectional view taken along lines 3-3 of FIGURE 1;

15 FIGURE 4 is a cross-sectional view similar to that of FIGURE 3, shown in a different operational position;

FIGURE 5 is an isometric view of a container assembly according to the preferred embodiment of the invention;

FIGURE 6 is a cross-sectional view taken along lines 6-6 in FIGURE 5;

20 FIGURE 7 is a bottom isometric view of the closure that is shown in FIGURE 1;

FIGURE 8 is an isometric view of an upper neck portion of the container that is depicted in FIGURE 5; and

FIGURE 9 is a different isometric view showing the upper neck portion of the container shown in FIGURE 8.

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### **DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT(S)**

Referring now to the drawings, wherein like reference numerals designate corresponding structure throughout the views, and referring first to FIGURE 5, a child resistant

container assembly 10 that is constructed according to the preferred embodiment of the invention includes a child resistant flip-top type closure 12 and a container 14. Referring briefly to FIGURES 8 and 9, it will be seen that container 14 includes a neck portion 16 defined around an orifice 18 that is in communication with an internal space of the container 14. Neck portion 16 includes a main cylindrical portion having external threading 20 defined thereon. Neck portion 16 further includes a first annular shoulder 22 that is proximate to and slightly beneath the external threading 20 and that has a substantially vertical dead stop surface 24 defined therein for purposes that will be described in greater detail below. A second annular shoulder 26 is positioned proximate to the external threading 20 and the first annular shoulder 22 and slightly beneath the first annular shoulder 22. Second annular shoulder 26 includes a pair of ratchet members 28 defined therein, each of which has inclined ramp surface 30 and an intersecting vertical stop surface 32.

Referring now to FIGURES 1-4, it will be seen that closure 12 includes a main closure body 34 having a top wall 36, the top surface thereof defining a relatively flat dispensing platform in which a dispensing nozzle 38 having a dispensing orifice 40 is defined therein. Dispensing orifice 40 is in communication with the orifice 18 of the container 14 when the closure 12 is secured on to the container 14. A substance that is stored within the container 14, such as liquid dishwashing detergent, may thus be dispensed from the dispensing orifice 40 when the closure 12 is opened and the container 14 is inverted or squeezed. As may best be seen in FIGURE 3, main closure body 34 includes a downwardly depending internal substantially cylindrical boss member 42 that is unitary with the top wall 36 and that has an inner surface 44 upon which a plurality of internal threads 46 are defined. These internal threads 46 are sized and shaped to mate with the external threading 20 of the neck portion 16 of the container 14.

Looking briefly to FIGURE 7, which is a bottom isometric view of the main closure body 34, it will be seen that the boss member 42 includes a downwardly extending segmental annular projection 48 that defines a substantially vertical stop surface 50. As can best be seen in FIGURE 6, vertical stop surface 50 engages with the vertical dead stop surface 24 on the neck

portion 16 of the container 14 when the closure 12 is screwed on to the container 14 so that overtightening of the closure 12 with respect to the container 14 is prevented.

Returning to FIGURES 1-4, the main body portion 34 of the closure 12 further includes a downwardly depending flexible outer sidewall 52 that is preferably provided with gripping structure such as a plurality of gripping ribs 54 on the outer circumferential surface thereof.

Closure 12 further includes a lid member 56 that is hingedly mounted in conventional flip-top fashion to the main body portion 34 by means of a hinge 58. In the preferred embodiment, the entire closure 12 including the main body portion 34, the lid member 56 and the hinge 58 is unitary molded as a single piece from a suitable plastic material such as high-density

polyethylene or polypropylene. As may best be seen in FIGURE 2, lid member 56 includes an upper wall 58 from which a plug member 62 extends downwardly from a lower surface 60 thereof. Plug member 62 fits within the dispensing orifice 40 of the dispensing nozzle 38, preferably in a snap in type action, when the closure 12 is in the closed position shown in

FIGURE 3. Lid member 56 further has a downwardly depending outer substantially cylindrical circumferentially extending sidewall 64 in which an opposing pair of detents 66, 68 are defined.

In the preferred embodiment, detents 66, 68 are constructed as through holes that extend through the entire wall thickness of the sidewall 64, but could alternatively be constructed as recesses that are defined in the interior surface of the sidewall 64 but do not extend through the outer circumferential surface of the sidewall 64. Detents 66, 68 are diametrically opposed from each

other and form part of a child safety interlock system 65 that advantageously secures the lid member 56 in the closed position until an unlocking action other than simply lifting the lid member 56 is performed by the consumer. Interlock system 65 further includes a pair of first and second latching pawls 70, 72 that are sized and shaped to be received within the first and second detents 66, 68 when the interlock system 65 is engaged. The first and second latching pawls 70,

72 are respectively mounted on distal ends of first and second lever members 80, 82 that are unitary with and cantilevered from the outer sidewall 52 of the closure main body 34. First and second actuation surfaces 74, 76 are defined on the respective outer surfaces of the first and second lever members 80, 82 and have a gripping surface 78 that in the preferred embodiment

includes a plurality of horizontally extending ribs. By exerting a predetermined force, specifically a radial squeezing force, in the area of the first and second actuation surfaces 74, 76 when the closure 12 is in the locked position shown in FIGURE 1 the cantilevered lever members 80, 82 will be caused to deflect inwardly, particularly at their distal ends, which will  
5 cause the first and second latching pawls 70, 72 to unseat themselves from the respective detents 66, 68 in the lid member 56 thereby releasing the interlock. Preferably, the predetermined radial squeezing force that is required to release the interlock is a force that would be beyond the expected strength of a small child. Preferably, this radial squeezing force is within a range of about 0.5 to about 5.0 pounds of force, and more preferably within a range of about 1.0 to about  
10 3.0 pounds of force.

As is that shown in FIGURE 1, indicium 96 is preferably provided on the upper surface of the top wall 58 to instruct the consumer how to operate the interlock system 65.

According to another advantageous feature of the invention, retention structure is preferably provided for deterring removal of the closure 12 from the container 14 after the  
15 closure 12 has been secured to the container 14. Referring to FIGURE 7, it will be seen that a pair of longitudinally extending ratchet ribs 88, 94 extend inwardly at an angle with respect to the radial direction from the inner surface of the outer sidewall 52 of the closure main body 34. Each of the ratchet ribs 80, 94 includes a ramped surface 90 leading to an internal edge 92. As the closure 12 is screwed on to the neck portion 16 of the container 14 the ramped surfaces 90 of  
20 the first and second ratchet ribs 88, 94 will engage and glide over the inclined ramp surfaces 30 of the ratchet members 28 that are defined on the second annular shoulder 26 of the container 14. However, any attempt to unscrew the closure 12 from the container 14 will be arrested by contact between the edge 92 of one of the ratchet ribs 88, 94 and the vertical stop surface 32 of one of the ratchet members 28. This retention structure is preferably constructed and arranged to prevent  
25 removal of the closure 12 from the container 14 by a person having strength that would be expected of a small child. In order to satisfy this standard, a predetermined minimum unscrewing torque is required to defeat the retention structure that is preferably at least 20 inch-pounds of torque, and is even more preferably at least 30 inch-pounds of torque.

It is to be understood, however, that even though numerous characteristics and advantages of the present invention have been set forth in the foregoing description, together with details of the structure and function of the invention, the disclosure is illustrative only, and changes may be made in detail, especially in matters of shape, size and arrangement of parts

5 within the principles of the invention to the full extent indicated by the broad general meaning of the terms in which the appended claims are expressed.